



United States  
Department of  
Agriculture

Forest  
Pest  
Management

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To : Supervisor, Angeles National Forest

Subject: Dieback in native junipers along county roads north of the Forest  
(FPM Report No. S99-1)

On October 27, 1999, I met with Steve Carbaugh (Resource Officer, Santa Clara/ Mojave Ranger District, Angeles National Forest), Dave Mings (Assistant Roadside Tree Superintendent, Dept. of Public Works, Los Angeles Co.), Dr. Jerry Turney (Biologist, The Arboretum of Los Angeles Co.), and other Los Angeles County personnel to examine junipers in the community of Juniper Hills, Los Angeles County. Residents of the area had reported that junipers had been suffering mortality along Cima Mesa and other roads in the community. There was concern that perhaps a pest from the Angeles National Forest might have moved onto adjacent private lands, causing the dieback.

The dominant vegetation in the area is native juniper, *Juniperus californica*, a small tree or large shrub. Limb dieback and apparent mortality of whole trees occurred in trees growing adjacent to the road right-of-way and occasionally, one tree in. No similar recent mortality was observed further from the road. On some stretches of Cima Mesa Road the damage was on one side but not the other, suggesting that wind direction was important in determining which trees were affected. Some of the affected trees had new growth, suggesting that at least partial recovery was occurring. County personnel uprooted and cut up some trees to allow inspection of the roots and stem. The trees were examined for diseases and insects, particularly those known from other areas to be capable of killing trees.

The most serious disease of native junipers in southern California is annosus root disease, caused by the fungus *Heterobasidion annosum*. This disease typically becomes established in a stand when trees have been cut down and the stumps left untreated. The fungus colonizes the stump and lives saprophytically in the root system. Nearby trees become infected when their roots contact the infected tissue. Mortality usually occurs in a circular patch around the original infection site (stump) and continues for decades, with trees dying gradually on the outside edge of the root disease center. This was not the mortality pattern observed in Juniper Hills, nor were stumps observed which were large enough to support the fungus. Thus it is unlikely that this disease is responsible for the mortality observed. Dr. Turney collected root samples to culture for pathogens.

High populations of leafy mistletoe, *Phoradendron densum*, were seen on some trees. This plant parasitizes the host's water conducting system. Acting alone it does not kill trees but rather



increases their moisture stress, particularly in drought years. Pruning out the parasites increases the vigor of the trees and is an appropriate treatment for high value specimens.

We found larvae or other evidence of three woodboring insects, (a) a twig miner, (b) an insect mining the pith and heartwood of main stems, and (c) an insect mining the phloem of the main stems. Several live larvae of the first two were collected. Most were put into rearing, but one larva of each of these two species was curated. In general immature insects can at best be identified to family, and it is usually necessary to rear the insects to the adult stage to determine their species. Woodboring beetles are particularly difficult to rear in the laboratory, and ideally should be collected as prepupae, pupae, or unemerged adults. These stages were not present at the time of our visit. No adults have as yet emerged from the material I am incubating in the laboratory, and I anticipate that further collections will be needed to obtain mature specimens for identification. These caveats aside, the following observations were made about these species:

- (a) The twig miner was a roundheaded beetle of the family Cerambycidae, and may be *Styloxus bicolor*, a juniper twig girdler. We observed one larva per shoot mining the center (pith region) of twigs. The larvae had also made distinctive mines around the circumference of the stems, at the base of the attacked portion of the stem. These mines cut through (girdled) the sapwood under the bark, and resulted in a distinct breakage pattern when the infested shoots were plucked. This pattern was also observed on shoots which had been attacked in previous years and broken off at the circular mine. This insect and its damage was found scattered on trees adjacent to and away from the road, and although the infested twigs were killed, the damage appeared to be unrelated to the dieback along the roads.
- (b) The insect mining the pith/heartwood region of the main stems appeared to be a flatheaded borer, family Buprestidae. Various species have been collected from *Juniperus*, but as previously stated, identification of this species requires specimens of adults. In addition, insects of juniper have been poorly studied, and the insect causing this damage may have previously been unreported. Larvae were found in both the dead or dying stems and in green stems, suggesting that it could be responsible for the death of the stems. With one exception (*Melanophila californica*, which feeds in pines), flathead borers feeding in conifers in California are thought to be secondary insects which only attack dead or dying material. It is possible that the primary cause of the dieback seen along Cima Mesa and nearby roads weakened the trees, making them susceptible to this borer. Because trees away from the road, not exhibiting signs of dieback, were on private property, it was not possible to adequately sample for this insect.
- (c) Damage from a second buprestid was observed under the bark on main stems. Dr. Turney collected a larva of this species for Dr. Rosser Garrison, Entomologist, Department of Agricultural Commissioner, Weights & Measures, County of Los Angeles, who was unable to visit the site on the scheduled date. It is possible that this is the same species as (b). General comments made re. (b) also apply to this insect.

Partial specimens of adult buprestids were found in the xylem of a long-dead stem. These will be sent to Dr. Garrison for possible identification. These specimens appeared to be associated with the mines which occurred just under the bark (type (c), above). No bark beetles (*Phloeosinus* spp.) were observed. Bark beetles would normally be expected to attack weakened trees if sufficient numbers of these insects were present in an area to respond to the available food source.

After some discussion, county personnel concluded that the primary cause of the dieback might be a change in the herbicides used to suppress vegetation along the road shoulders, combined with unusually dry weather. In the past the county has used Oust, but in 1999, Telar was added to the mix. Lack of precipitation after the January application may have resulted in enough herbicide residue on roadside dust to have later blown up on nearby junipers. Because the dieback was only seen adjacent to roads, this conclusion appears to be consistent with the pattern of mortality. County personnel decided to return to using Oust alone.

The damage observed in October was off the Forest and would normally not be of concern to Forest Service personnel. However, there is potential for populations of the buprestids to build and cause more mortality. It is of particular concern that the species causing the damage have not been identified. It would be helpful if District employees and their families could continue to monitor the area and call me if more mortality is seen, particularly if the mortality is on National Forest lands.

Please contact me at (909) 680-1582 if you have any questions about this report.

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